

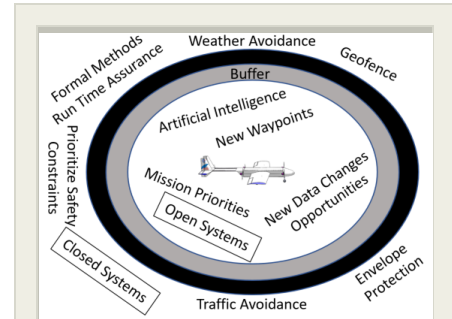
High-Integrity SAFIT, Phase I

Completed Technology Project (2017 - 2017)



Project Introduction

Our team is proposing to develop a high-integrity flight management system and multi-UAS ground control station (GCS) called the Safe Autonomy Flexible Innovation Testbed (SAFITTM) for safe operation of multiple fixed-wing UAS across a wide range of missions, including Beyond Visual Line of Sight operations. The onboard flight management system will include: Onboard autonomous traffic and obstacle avoidance, geospatial containment, and flight envelope protection; Waypoint route-following, using preplanned route or waypoints produced in real-time by an onboard application or from ground control station; Direct control inputs from an onboard application or manual control from the ground control station. Traffic and obstacle avoidance and geospatial containment will be based on publicly available ICAROUS software developed by NASA Langley's formal methods team. Formal methods will be applied to core safety elements, including high-level formal specification and verification of accordance with key safety properties. AAG's key strengths in flight dynamics and UAS separation assurance, combined with NIA's formal methods experience make our team uniquely suited to perform this effort. Phase I will show technical feasibility and demonstrate verification/certification feasibility of applying formal methods combined with extensive testing, through meeting the following objectives: Generate high-level architecture and verification/certification strategy; Demonstrate feasibility of applying formal methods by proving the high-level specification meets a limited set of safety properties; Create a prototype implementation of the flight management system and limited GCS and demonstrate in simulation and in flight; Create a simulation prototype of an advanced multi-UAS GCS; Develop commercialization plan. In a follow-on Phase II effort, AAG and NIA plan to focus on completing development and verification of SAFITTM and collecting artifacts to support future certification.



High-Integrity SAFIT, Phase I
Briefing Chart Image

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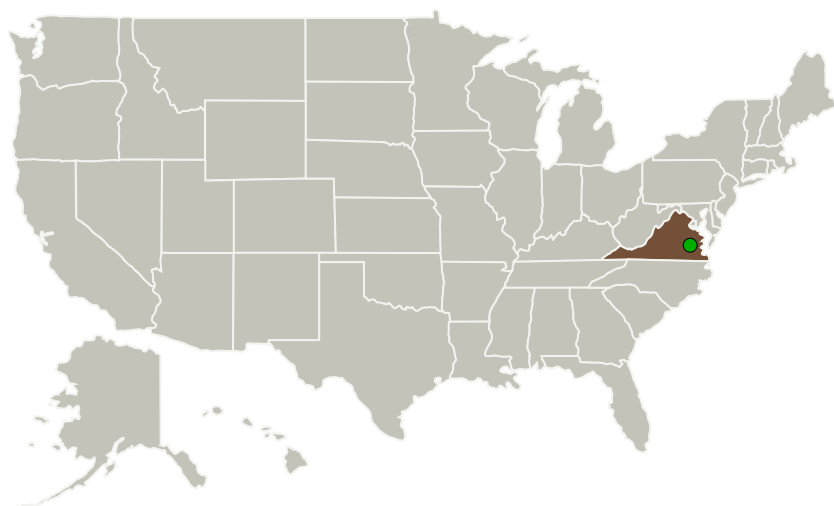
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Adaptive Aerospace Group, Inc.	Lead Organization	Industry	Hampton, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Virginia

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Adaptive Aerospace Group, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

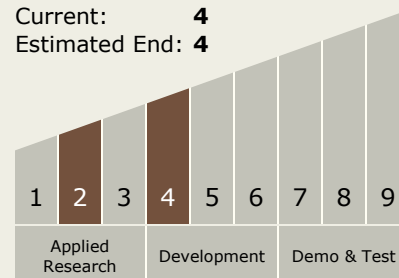
Carlos Torrez

Principal Investigator:

Sally Johnson

Technology Maturity (TRL)

Start: 2
 Current: 4
 Estimated End: 4

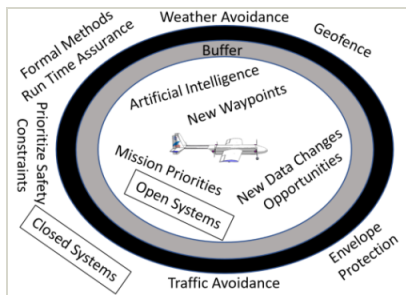


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Images



Briefing Chart Image

High-Integrity SAFIT, Phase I

Briefing Chart Image

(<https://techport.nasa.gov/image/136457>)

Technology Areas

Primary:

- TX10 Autonomous Systems
 - └ TX10.2 Reasoning and Acting
 - └ TX10.2.4 Execution and Control

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System